LQx / RLx Series

LQx and RLx Series User's Manual

Newport®

Experience | Solutions

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of 90 days from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for an additional 90 days.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages resulting from the purchase or use of its products.

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This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

Newport Corporation
1791 Deere Avenue
Irvine, CA, 92606 USA

P/N 41317-01 Rev. D

EU Declaration of Conformity

We declare that the accompanying product, identified with the CE mark, complies with requirements of the Electromagnetic Compatibility Directive, 89/336/EEC and the Low Voltage Directive 73/23/EEC.

Model Number: LQA, LQC, LQD, RLA, RLC, and RLD Series Laser Source Modules

Year CE mark affixed: 2004

Type of Equipment:

Electrical equipment for measurement, control and laboratory use

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326-1:1997+A1+A2 “Electrical equipment for measurement, control and laboratory use – EMC requirements”

This equipment meets the Class A radiated and conducted emission limits.

BS EN 61000-3-2:2001, Harmonic current emissions, Class A

BS EN 61000-3-3:2002, Voltage fluctuations and flicker

BS EN 61010-1:2001, A1+A2 “Safety requirements for electrical equipment for measurement, control and laboratory use”

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Dan Dunahay
Director of Quality Systems
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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling

1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**. Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

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1 General Information

1.1 Introduction

Newport's **LQx Series Laser Diode Light Source Modules** can be used in analytical, industrial and biomedical applications, such as spectroscopy, interferometry, machine vision, marking, flow cytometry and tissue fluorescence. The **RLx Series** can be for Raman spectroscopy, holography, and interferometry. Modules are available at various wavelengths and output power levels, with the choice of either elliptical or circular output beam shape. Both the LQx and RLx Series includes self-contained laser diode modules with superior optical quality and ultra-stable temperature, wavelength and output power control. The LQx and RLx Series modules feature a precision current source and a PID temperature controller. Three types of LQx and RLx Series are featured:

LQC/RLC Series - CW operation

LQA/RLA Series - Analog modulation of up to 20 MHz

LQD/RLD Series - Digital modulation (via TTL) of up to 100 MHz

For the LQx Series, both elliptical (E versions) and circular beam output options are available. Circular beams are generated using either a microlens (C versions) or an anamorphic prism pair (P versions) resulting in a higher beam quality. The LQx Series can be ordered with a fiber pigtail. See the Newport Catalog or website for fiber pigtail options for the LQx series. The RLx Series comes standard with an SMA fiber pigtail.

The center wavelength indicated by the LQx model number is typical. Center wavelength accuracy for LQx Series is as follows:

Wavelengths less than 700 nm, accuracy +/- 10 nm

Wavelengths 700-1300 nm, accuracy +/- 15 nm

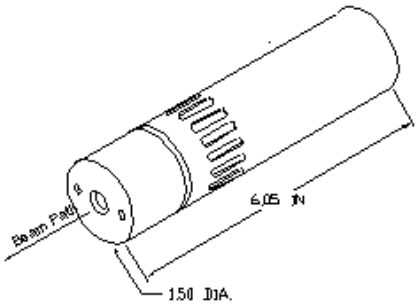
Wavelength 1300-1600 nm, accuracy +/- 20 nm

Wavelength greater than 1600 nm, accuracy +/- 10 nm

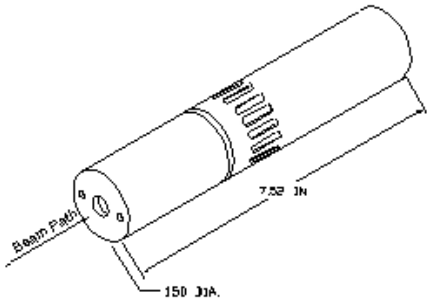
All RLx Series modules center wavelengths are accurate to +/- 0.5 nm

All LQx and RLx modules require an external 4.8 to 12 VDC power source. Modules with wavelengths below 500 nm require an 8 to 12 VDC power source. Newport offers a 5 and 12 VDC supply for use with the LQx and RLx series. The LPMS-5-110 and LIQS-12-110 Power Supplies meet CDRH requirements by providing an interlock input, key enable switch, delayed start-up, and laser active indicator. These units are shown in the ordering table and are not included with the Laser Diode Light Sources Modules. 220 VAC input versions are also available.

The LQx and RLx series can be configured with a variety of laser diodes at various output powers and operating wavelengths. Products with output powers above 5mW or with IR output are not intended for surveying, leveling, and alignment applications. Visible units less than 5mW are CDRH certified as laser systems.



-xxE



-xxP

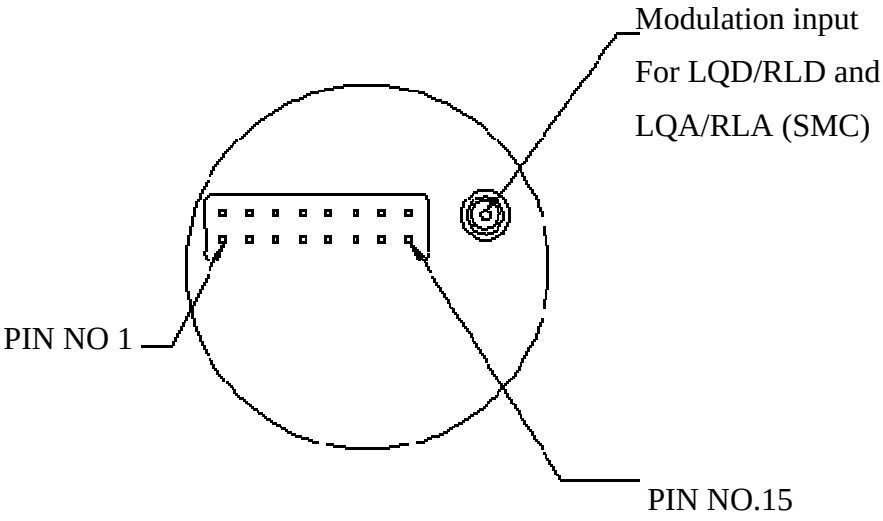
1.2 Installation

Do not mount the laser in a thermal insulating material, such as foam plastic. Heat can have adverse effects on laser diodes. Such effects include decreased output power and large shifts in wavelengths. Lasers below 5mW may not need a heat sink. For best heat dissipation use a metal mounting fixture like Newport's ULM Series mounting brackets. A heat sink is always recommended for operating temperatures above 25°C.

The operating voltage for the LQx and RLx Series laser modules is 5 – 12 VDC. Modules less than 500nm require 8 – 12 VDC.

If the label attached to the laser module reads, "This product complies with 21CFR 1040.10 and 1040.11," a permanently installed switch at the power source will be required to retain the modules certification as a laser system. This certification is void if the unit is enclosed or otherwise inaccessible, if the labels are modified or removed, or if the system is permanently connected (i.e. soldered, etc.) directly to the power source without the required switch. Modifying the laser will void the CDRH certification. If the distance between the laser head and the power source switch exceeds two meters, an emissions indicator must be mounted near the switch.

This laser module is connectorized for easy integration into your application. The unit may feature as many as two connectors on the rear panel. The SMC connector is present only for those units featuring analog or TTL beam modulation. The 16-pin header connector is present on all units and accommodates the DC supply voltage and monitoring connections. Connections are listed below:



A power only cable is provided with the LQx/RLx series. Newport supplies two accessory cables for easy access to the monitoring connections. The part number for the cables for the CW lasers is LQC-CAB and the cable part number for the analog and digital lasers is LQA-CAB. If you prefer to manufacture your own cable harness, we recommend using Molex part number 22-55-2161 and crimp terminal 16-02-0103 or equivalents. Newports's standard cable includes only the 5 VDC and ground leads.

Pin	Wire Color	Description
1	Red	5 VDC
2	Red	5 VDC
3		For future use
4	Wht/Brown	Temperature Reference (-)
5		For future use
6		For future use
7	Blue	Laser Diode Current Monitor (+)
8		For future use
9	White	Temperature Monitor (+)
10		For future use
11	Yellow	Error signal/Inhibit
12	Gray	Photodiode monitor (+)
13		5 VDC required for CW laser diode over 500 mA in drive current
14	Blue	Laser Diode Current Reference (-) / Photodiode Monitor (-)
15	Black	Ground
16	Black	Ground

Table 1 Pin/Wire Table

LQA/RLA and LQD/RLD lasers that feature analog or digital modulation will have an SMC connector on the rear of the unit adjacent to the 16-pin header connector.

ANALOG MODULATION USERS: Analog modulation requires an input voltage on the SMC Connector. A control voltage of 1 VDC will yield a 100% power output. A control voltage of 0 VDC will yield a threshold power output. The relationship between voltage and output power is not linear.

TTL MODULATION USERS: TTL modulation requires an input voltage on the SMC Connector. A control voltage of 5 VDC will yield a threshold power output. A control voltage of 0 VDC will yield a 100% output.

The temperature of the laser diode can be monitored by measuring between Temperature Monitor (Pin 9) and Temperature Reference (Pin 4). This

reading can be compared with the chart below to determine the diode's temperature.

Temp. C	Vread	Temp. C	Vread	Temp. C	Vread	Temp. C	Vread
0	-1.32767	13	-0.66514	26	0.054539	39	0.716055
1	-1.28138	14	-0.61036	27	0.10865	40	0.762217
2	-1.23418	15	-0.55523	28	0.162832	41	0.807535
3	-1.18594	16	-0.5	29	0.216358	42	0.85188
4	-1.13723	17	-0.44408	30	0.269009	43	0.895125
5	-1.08717	18	-0.38851	31	0.321193	44	0.93808
6	-1.03673	19	-0.33268	32	0.373068	45	0.979471
7	-0.98531	20	-0.27679	33	0.42449	46	1.021127
8	-0.93358	21	-0.22106	34	0.474951	47	1.061254
9	-0.88083	22	-0.16573	35	0.524803	48	1.099712
10	-0.82776	23	-0.10994	36	0.573708	49	1.138216
11	-0.77408	24	-0.05501	37	0.621683	50	1.17566
12	-0.72001	25	0	38	0.66917		

Table 2 Voltage Values at Specific Temperatures Celsius

There are also two formulas that can be used to calculate the temperature based on the reading between Pin 4 and Pin 9. Formula 1 compensates for the non-linearity of the temperature sensor and has a result accurate to within 1 degree C over a 0 to 50 degree range:

Temp = (1.0156*meas^6) + (-0.2863*meas^5) + (-5.337*meas^4) + (2.9298*meas^3) + (7.6051*meas^2) + (16.468*meas) + 25

Formula 2 has no compensation and has a result accurate to 3 degrees over a 0 to 50 degree range (most accurate at 25 degrees):

Temp = 100*(V+1.25)/0.05008

Pin 11 has two functions. It can be monitored for an error signal. If the voltage is low (~0VDC) then laser diode has been shutdown due to temperature conditions. If the monitored voltage is high (~5VDC), then the laser module is operating properly. As a secondary function, the user can disable the laser output by grounding this pin.

1.3 Operation

1.3.1 Operation and Control Procedure

The LQx and RLx Series does not have any user adjustable controls. The user may adjust the focus or collimation of the output beam on E models by using the supplied spanner wrench to increase or decrease the distance between the diode and the optic. The P (prism) series does not have adjustable optics.

1.3.2 Preventative Maintenance

This laser module contains no user serviceable parts. Occasionally the optics may need cleaning depending on environmental conditions. When cleaning is required, the use of clean, compressed air is recommended to blow the optics clean. If compressed air fails, clean lens carefully with alcohol and a lint free rag or Q-tip.

1.3.3 Laser Safety

Class 3b and 4 lasers are not intended for use in surveying, leveling, alignment, or medical applications.

	CAUTION **Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

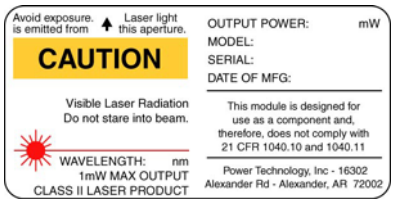
	CAUTION **The use of optical instruments with this product will increase eye hazard. Do not shine laser in the direction of other people or at reflective surfaces that might cause exposure to the human eye. Do not mount the laser at eye level.**

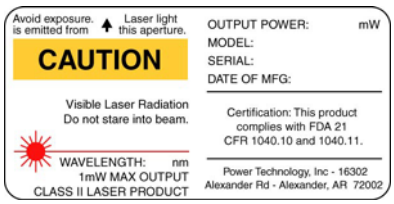
Modifications, that affect any aspect of the product's performance or intended functions will require re-certification and re-identification of the product in accordance with the provisions of 21CFR 1040.10 and 1040.11.

The product labels shown below can typically be found near the output optics.

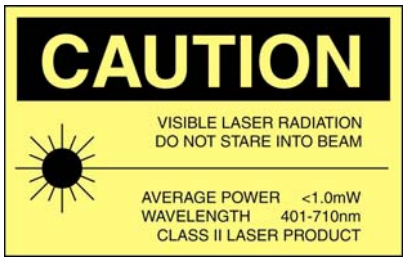
Class II Laser:
Visible Laser Radiation
Do Not Stare Into Beam

☐ Component ☐ System


Avoid exposure. is emitted from
Laser light this aperture.
CAUTION
Visible Laser Radiation
Do not stare into beam.
WAVELENGTH: nm
1mW MAX OUTPUT
CLASS II LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
This module is designed for use as a component and, therefore, does not comply with 21 CFR 1040.10 and 1040.11
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002

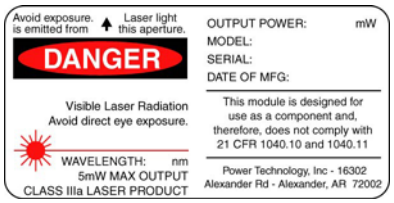

Avoid exposure. is emitted from
Laser light this aperture.
CAUTION
Visible Laser Radiation
Do not stare into beam.
WAVELENGTH: nm
1mW MAX OUTPUT
CLASS II LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
Certification: This product complies with FDA 21 CFR 1040.10 and 1040.11.
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002

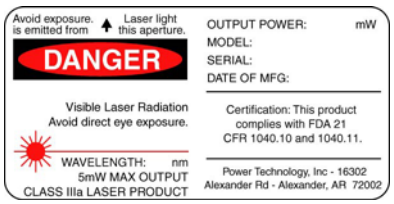
One of the above labels is attached to the laser head.



Class IIIa Laser:
Visible Laser Radiation,
Avoid Direct Eye Exposure

☐ Component ☐ System

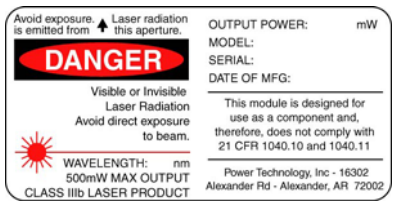

Avoid exposure. is emitted from
Laser light this aperture.
DANGER
Visible Laser Radiation
Avoid direct eye exposure.
WAVELENGTH: nm
5mW MAX OUTPUT
CLASS IIIa LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
This module is designed for use as a component and, therefore, does not comply with 21 CFR 1040.10 and 1040.11
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002

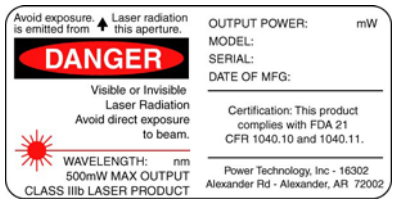

Avoid exposure. is emitted from
Laser light this aperture.
DANGER
Visible Laser Radiation
Avoid direct eye exposure.
WAVELENGTH: nm
5mW MAX OUTPUT
CLASS IIIa LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
Certification: This product complies with FDA 21 CFR 1040.10 and 1040.11.
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002

One of the above labels is attached to the laser head.

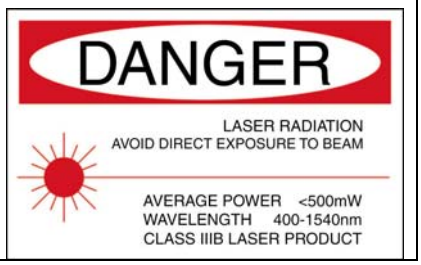
Class IIIb Laser:
Visible Or Invisible Laser Radiation
Avoid Direct Exposure To Beam

☐ Component ☐ System


Avoid exposure. is emitted from
Laser radiation this aperture.
DANGER
Visible or Invisible Laser Radiation
Avoid direct exposure to beam.
WAVELENGTH: nm
500mW MAX OUTPUT
CLASS IIIb LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
This module is designed for use as a component and, therefore, does not comply with 21 CFR 1040.10 and 1040.11
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002


Avoid exposure. is emitted from
Laser radiation this aperture.
DANGER
Visible or Invisible Laser Radiation
Avoid direct exposure to beam.
WAVELENGTH: nm
500mW MAX OUTPUT
CLASS IIIb LASER PRODUCT
OUTPUT POWER: mW
MODEL:
SERIAL:
DATE OF MFG:
Certification: This product complies with FDA 21 CFR 1040.10 and 1040.11.
Power Technology, Inc - 16302 Alexander Rd - Alexander, AR 72002

One of the above labels is attached to the laser head.



2 Factory Service Information

2.1 Service Form

Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name_____ Return Authorization # _____
(Please obtain RA# prior to return of item)

Company _____

Address _____ Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number_____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____
_____
_____
_____
_____
_____

Reason for return of goods (please list any specific problems):
_____
_____
_____
_____
_____
_____
_____
_____
_____

Notes:

Newport Corporation
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ISO 9001
FM 27207

Newport Corporation, Irvine, California, has been certified compliant with ISO 9001 by the British Standards Institution.

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